

CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1-33 (Canceled)

34. (Previously presented) A method comprising:

communicating information between Internet protocol (IP) hosts over a controller area network (CAN) bus within a vehicle by encapsulating an IP message in a CAN protocol message.

35. (Previously presented) The method of claim 66, including using the IP destination address to determine a next-hop IP address.

36. (Previously presented) The method of claim 35, including determining a CAN bus address based upon the next-hop IP address.

37. (Previously presented) The method of claim 36, wherein if the next hop IP address is a broadcast or multi-cast address, a CAN global address is used as the CAN bus address.

38. (Previously presented) The method of claim 36, including, if the next hop IP address is a unicast address, using an address resolution protocol request to determine the CAN bus address.

39. (Previously presented) The method of claim 38, wherein using an address resolution protocol request further comprises:

transmitting a CAN bus address request message on the CAN bus; and
receiving a reply message from one of the IP hosts, including the CAN bus address.

40. (Previously presented) The method of claim 36, further comprising:
transmitting the CAN/IP message to the CAN bus address; and
receiving the CAN/IP message at a first one of the IP hosts, which corresponds to the CAN bus address.

41. (Previously presented) The method of claim 40, further comprising, after receiving the CAN/IP message, authenticating the CAN/IP message as being from a second one of the IP hosts.

42. (Previously presented) The method of claim 41, wherein authenticating the CAN/IP message comprises:

extracting a CAN source address from the CAN/IP message, wherein the CAN source address is associated with the second of the IP hosts; and

comparing the CAN source address with known CAN addresses stored in an address resolution protocol (ARP) cache, which stores CAN bus addresses and IP addresses.

43. (Previously presented) The method of claim 42, further comprising, if the CAN source address is not found in the ARP cache, verifying the CAN/IP message was sent from the second one of the IP hosts, wherein said verifying comprises:

transmitting a query message on the CAN bus to the CAN source address;
receiving a query reply message from the second one of the IP hosts verifying the CAN/IP message; and
adding the CAN source address to the ARP cache.

44. (Previously presented) The method of claim 41, further comprising, after authenticating the CAN/IP message, determining the CAN/IP message type.
45. (Previously presented) The method of claim 44, further comprising, if the CAN/IP message type is an ARP request corresponding to the first one of the IP host's IP address, sending an ARP reply verifying the first one of the IP host's address.
46. (Previously presented) The method of claim 44, further comprising if the CAN/IP message type is an ARP reply to a previously sent ARP request, adding the IP address extracted from the ARP reply to the ARP cache.
47. (Previously presented) The method of claim 44, further comprising, if the CAN/IP message type is a CAN/IP datagram, extracting and processing the IP message.
48. (Previously presented) An apparatus comprising:
a first Internet protocol (IP) host located within a vehicle, coupled to a controller area network (CAN) bus, and configured to communicate with a second IP host by encapsulating an IP message in a CAN protocol message to create a CAN/IP message, wherein the CAN/IP message includes an IP destination address.
49. (Previously presented) The apparatus of claim 65, wherein the first IP host is configured to use the IP destination address to determine a next-hop IP address.
50. (Previously presented) The apparatus of claim 49, wherein the first IP host is configured to use the next-hop IP address to determine a destination CAN bus address.
51. (Previously presented) The apparatus of claim 50, wherein the first IP host is configured to broadcast a CAN global address as the CAN bus address if the next hop IP address is a broadcast or multi-cast address.

52. (Previously presented) The apparatus of claim 50, wherein the first IP host is utilized to transmit an address resolution protocol (ARP) request to determine the CAN bus address if the next hop IP address is a unicast address.

53. (Previously presented) The apparatus of claim 52, wherein the first IP host is utilized to transmit a CAN bus address request message on the CAN bus, and to receive a reply message from the second IP host, including a CAN bus address.

54. (Previously presented) The apparatus of claim 65, wherein the second IP host is configured to authenticate the CAN/IP message from the first IP host after receiving the CAN/IP message.

55. (Previously presented) The apparatus of claim 54, wherein the second IP host is further configured to extract a CAN source address from the CAN/IP message and compare the CAN source address with known addresses stored in an ARP cache, which stores CAN bus addresses and IP addresses.

56. (Previously presented) The apparatus of claim 55, wherein if the CAN source address is not found in the cache, the second IP host is configured to transmit a query message on the CAN bus to the CAN source address and, if the second IP host receives a query reply message from the first IP host, to add the CAN bus address for the first IP host to the ARP cache.

57. (Previously presented) The apparatus of claim 54, wherein after authenticating the CAN/IP message, the second IP host is configured to determine the CAN/IP message type.

58. (Previously presented) The apparatus of claim 57, wherein the second IP host is configured to send an ARP reply verifying the second IP host's address if the CAN/IP message type is an ARP request corresponding to the second IP host's IP address.

59. (Previously presented) The apparatus of claim 57, wherein the second IP host is configured to add the IP address extracted from the ARP reply to the ARP cache if the CAN/IP message type is an ARP reply to a previously sent ARP request.

60. (Previously presented) The apparatus of claim 57, wherein the second IP host is configured to extract and process the IP message if the CAN/IP message type is a CAN/IP datagram.

61. (Currently amended) A system comprising:

means for generating an Internet protocol (IP) message; and
means for communicating information between ~~Internet protocol (IP)~~ IP hosts within a vehicle equipped with a controller area network (CAN) bus and vehicle modules within the vehicle by encapsulating ~~an~~ the IP message in a CAN protocol message to create a CAN/IP message, wherein the CAN/IP message includes an IP destination address.

62. (Previously presented) A method comprising:

encapsulating an Internet protocol (IP) message in a controller area network (CAN) protocol message, to create a CAN/IP message including an IP destination address of an IP host on a CAN bus within a vehicle;

determining a CAN bus address corresponding to the IP destination address; and
transmitting the IP message to the IP host by transmitting the CAN/IP message on the CAN bus to the CAN bus address.

63. (Previously presented) The method of claim 62, wherein a CAN device and said IP host are coupled to the CAN bus.

64. (Previously presented) The apparatus of claim 48, wherein the first IP host is configured to communicate with the second IP host by transmitting the CAN/IP message over the CAN bus.

65. (Previously presented) The apparatus of claim 64, wherein a CAN device and said first and second IP hosts are coupled to the CAN bus.

66. (Previously presented) The method of claim 34, wherein a result of said encapsulating is a CAN/IP message which includes an IP destination address.

67. (Previously presented) The method of claim 34, wherein a CAN device and said IP hosts are coupled to the CAN bus.